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ABSTRACT

This study examines the rate of educational attainment of women in Brazil. There have been dramatic increases in women's educational attainment, where today women are better educated than men. The study explores the importance of education and income of mothers and fathers in explaining the growth that has occurred. Maternal education has a bigger impact on schooling of children and a bigger impact on education of daughters, relative to sons. Paternal education has a greater impact on education of sons. One explanation for these differences is that parents do not pool income when allocating household resources. This hypothesis is tested by comparing the differential impact of maternal income on schooling of daughters relative to sons with differences in the impact of paternal income on the education of sons relative to daughters. The data were drawn from the 1982 "Pesquisa Nacional por Amostra de Domicilos (PNAD), a very large household labor force survey in Brazil. After controlling for a household fixed effect, these "differences-in-differences" are significant indicators that income-pooling is not consistent with the data. Contains 49 references. (Author/EH)

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Parental investments in schooling: The roles of gender and resources in urban Brazil

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Abstract

There have been dramatic increases in educational attainment in Brazil over the last half-century. These increases have been especially rapid for women who are, today, better educated than men. The importance of the education and income of mothers and fathers in explaining this growth is explored. Relative to paternal education, maternal education has a bigger impact on schooling of children and it has a bigger impact on education of daughters, relative to sons. In contrast, paternal education has a bigger impact on schooling of sons relative to daughters. One explanation for these differences is that parents do not pool incomes when allocating household resources. That hypothesis is tested by comparing the differential impact of maternal income on schooling of her daugthers relative to her sons with differences in the impact of paternal income on the education of his sons relative to his daughters. After controlling for a household fixed effect, these "differences-in-differences" are significant indicating that income-pooling is not consistent with the data.

1. INTRODUCTION

One of the key driving forces behind social, economic, and demographic change is education. It plays a particularly important role in Brazil where, for example, schooling alone explains more than 50% of the variation in labor market earnings. Studies have shown that parental education is a powerful predictor of the education and human capital of their children. Thus, in addition to having a direct effect on the well-being of their children, parental background and resources have an important indirect effect through their influence on the educational achievement of their children.

It has frequently been noted that, relative to father's education, maternal education plays an especially important role in influencing socio-economic and demographic outcomes of children. In this paper, we investigate a series of more subtle questions by examining whether the effects of maternal and paternal resources differ depending on the gender of the child, focussing on schooling attainment. Brazil is an especially interesting study site for these analyses because there have been dramatic increases in education over the last half century, and the gender gap in schooling has not only declined but, among recent cohorts, females are better educated than males. Focussing on the influence of parental education, we find that among adults born during the 30 years between 1928 and 1957, maternal education has a bigger impact on completed schooling of daughters, relative to sons, whereas paternal education has a bigger impact on education of sons. These "differences-in-differences" are significant. This may reflect gender-specific differences in the technology of human capital production: it may, for example, be efficient for fathers to spend more time with their sons, mothers with their daughters. However, it may also reflect disagreement among mothers and fathers regarding the allocation of resources within the household: that is, parents may not be pooling their incomes.

The latter hypothesis is tested by comparing the impact of paternal income on the educational attainment of his sons, relative to his daughters, with the impact of maternal income on the schooling of her sons, relative to her daughters. There are significant differences in these differential income effects. Since income does not belong in the education production function, we conclude that mothers and fathers do not behave as if they pool their incomes.

The paper proceeds as follows. The next section outlines the model underlying the empirical strategy and sets out the hypotheses we will test. The data are described along with trends in completed education of men and women over the past 50 years in Brazil. Section 4 discusses the regression results, and a conclusion summarizes the evidence.

2. MODEL AND ESTIMATION

To study the determinants of education outcomes, we follow the seminal work of Becker (1974, 1981) and Ben-Porath (1967), and integrate a model of household decision making along with a model of child human capital accumulation. Educational attainment of child i, θ_i, is produced by a set of inputs, M, such as time spent at school or time spent with the parents:

$$\theta_i = \theta_i (M, \mu', \eta_i) \qquad [1]$$

Education outcomes may also depend on characteristics of the child (such as age and sex), the family (such as maternal and paternal education), and the community (such as school availability and quality). We represent all these conditioning factors by μ', each of which may have a direct impact on educational attainment, and each may also affect the shape of the education production function θ. η_i represents individual-specific unobserved heterogeneity in schooling achievement which includes, for example, unmeasured child ability.

Given the production function [1] and a household budget constraint, it is assumed that the household chooses allocations to maximize its welfare, which depends on commodity consumption and the level of human capital of individual members. Assume each household member, m=1...M, wishes to maximize his or her own utility given by:

$$\upsilon_m (x, \ell, \Theta; \mu, \varepsilon) \qquad [2]$$

where x is a vector of goods demanded by each member and ℓ is a vector of leisure of each member. Θ can be thought of as a vector of home-produced commodities; in this paper, we focus on one element of the vector, θ, educational attainment of children. μ represents background characteristics, which may affect tastes, such as education, of all household members (and will include those characteristics that

directly affect education through the production function, μ'). The vector ϵ represents unobserved taste heterogeneity among household members.

Virtually every economic model of the household assumes that it may be treated as a single individual or as a group of individuals who *pool their income*. In that case, the household may be treated as if it allocates resources to maximize a household welfare function, [2]. We take a more general approach and permit heterogeneity in preferences among household members (see, for example, McElroy, 1990; Chiappori, 1988, 1992; Lundberg and Pollak, 1993). In these *individualistic* models, the allocation of resources will depend not only on the level of household resources such as income and assets, but also on the distribution of control over those resources. For example, if, relative to her husband, a mother wants to allocate more resources to investments in her children, then child investments will depend on the extent to which she can assert her preferences.

This model of household decision-making implies a demand for child schooling, θ_i, which depends on exogenous child, family, and community characteristics, $\bar{\mu}$:

$$\theta_i = \theta_i (\bar{\mu}, \xi_{si}) \qquad [3]$$

ξ_{si} represents individual specific heterogeneity, part of which may be common across individuals within a household because of, for example, family-specific variation in ability or quality of inputs into human capital. One goal of this study is to compare the impact of maternal and paternal resources on the education outcomes of sons and daughters. Under the assumptions of the income pooling model, only the level of household income will be elements of $\bar{\mu}$. However, according to the individualistic models, both the level of income and the distribution of control over it will affect child schooling.

We begin by exploring the impact of maternal and paternal education on child schooling. There is a very large literature documenting that parental education has a powerful impact on educational attainment in both the United States and in developing countries.[1] Brazil is no exception (Barros and Lam, 1992). The majority (but certainly not all) of these studies indicate that maternal education has a

[1]For studies of the United States, see, for example, Blau and Duncan (1967); Featherman and Hauser (1978); Gordon (1977); Leibowitz (1974); Solon (1992); Zimmerman (1992). Willis (1985) reviews the U.S. literature and Schultz, (1988) and Behrman (1990) review the literature from developing countries.

bigger impact on child human capital outcomes than paternal education; see, for example, Behrman and Deolalikar (1988) for a review. A common explanation given is that women tend to be the primary care-givers; therefore the mother's inputs into the education production function are more important than those of the father. In the context of the more general model outlined above, however, a larger maternal education impact on child education may also be because parents do not pool resources. This issue will be taken up again below.

Rather little attention has been paid in the literature to comparing the impact of household resources on education of sons relative to daughters. We assess whether better educated parents tend to have better educated sons relative to their daughters. Lower educational attainment of women, particularly in Africa and South Asia, along with substantially higher infant and child mortality among girls in South Asia, has been extensively documented.[2] Those observations have most frequently been attributed to discrimination against girls, and some have claimed there is supporting evidence in fertility preferences which are said to reveal a desire for sons, again mostly in Asia. (Recent studies, however, suggest the evidence is ambiguous and that in many cases parents seek a balanced family with at least a son and a daughter; see Das Gupta, 1994, for example.)

While gender preference may explain these observations, the model above makes clear that they may also be explained by differences in the net returns to investments in sons and daughters. For example, if the family seeks to maximize household income (across generations), and sons reap greater labor market advantages from being more educated than do daughters, then it will be optimal for the family to invest more heavily in sons. It is important to recognize that it is the present discounted value of net returns that enters this calculation since the opportunity costs of educating a son and daughter may not be the same. Daughters, for example, may provide services in the home (such as child care or domestic service), and there is some evidence that older sisters either enter the labor force or marriage in order to finance the schooling of their younger siblings (Parish and Willis, 1993). Implementing incentive-compatible rules regarding transfers from one family member to another, both across generations and

[2]Das Gupta (1987), Sen (1990) and Behrman (1992) provide insightful discussions.

within generations, further complicates the model substantially. The main point is that observing parental education (or income) has a bigger influence on the education of a son relative to a daughter does not have an unambiguous interpretation: it may reflect preferences for sons or it may reflect joint household decisions in response to market signals.

If net returns to investing in sons and daughters do differ and parents pool resources, then it is likely that *both* paternal and maternal resources will be channelled towards children of the same gender. This will be examined by comparing the impact of a mother's education on the education of her son relative to her daughter and making the same comparison for paternal education. If maternal education influences a daughter's education more than that of a son, and paternal education has a bigger impact on a son, then it seems less likely that the investments are determined purely by differential returns to the household. This suggests a simple "difference-in-difference" test in which we determine whether the differential impact of maternal education on sons, relative to daughters, is different from the differential impact of paternal education on sons, relative to daughters.

It is important to recognize that a significant "difference-in-difference" of the impact of parental education on child education in [3] does not necessarily imply that parents do not pool income. It may reflect differences in the technology of child human capital production, [1], the shape of which could be gender-specific. For example, mothers may be better role models for daughters and fathers for sons. In terms of a model of household time allocation and specialization within the marriage (Durkheim, 1933; Becker, 1980), the pattern may also be a reflection of mothers spending more time with their daughters, and fathers with their sons (Morgan, Lye and Condran, 1988). Because [3] is a reduced form, and because maternal and paternal education may enter it both through technology [1] and preferences [2], we cannot disentangle the two with this strategy. Nevertheless, evidence that there are gender-specific investment patterns among children has potentially important implications for the relative intergenerational mobility of men and women. This is particularly germane in a society, like Brazil, where female educational attainment has been increasing faster than that of men.

Parallel evidence regarding the impact of parental income on child education will be presented to directly test the hypothesis that parents pool their incomes. Since income does not directly enter the child

education production function, differential income effects cannot be attributed to differences in the technology of human capital production. However, the allocation of paternal and maternal time to the labor market, to child care, and to other household activities are all jointly determined, so estimated income effects will be biased because of unobserved heterogeneity in this model. In principle, one might resort to using nonlabor income (Schultz, 1990; Thomas, 1990), but in a dynamic model, nonlabor income is also endogenous and, in any case, very few people report any nonlabor income in the survey examined here. We follow a different strategy.

If unobserved heterogeneity is fixed within the household, then income effects in models that include a household fixed effect will be uncontaminated by simultaneity bias. Intuitively, the fixed effects model amounts to a comparison of the impact of paternal and maternal income on the education of a son relative to his sister and, in a sense, the strategy may be thought of as a "natural experiment". But, if the gender of a child is not exogenous or if it is related to confounding factors which are associated with the distribution of parental income or education, then the fixed effects will be biased. The assumption of a fixed effect will not be valid if, for example, time allocation choices are made with reference to unobserved gender-specific child-level attributes such as a mother choosing to go to work because she has a daughter (say to invest in the education of the daughter). While that can, in principle, be tested by examining whether the labor supply of women is affected by the gender composition of children, it is not obvious how to simultaneously control for scale effects (the number of children) which is also a choice. The fixed effect assumption also rules out the possibility that a mother who is more successful than would be predicted, given her income and education, has daughters (say) who do better at school than their brothers. This may arise if these mothers are better role models for their daughters or if they care more about the education of their daughters than sons. An analogous argument applies to fathers, and the important point is that there is a differential correlation between unobservable characteristics of parents and educational attainment of either sons or daughters.

The assumption of a household fixed effect is maintained for our tests of income pooling. While it is very important to be clear that, *a priori,* the assumption is not innocuous, by focussing on differences between sons and daughters, our strategy addresses one of they key weaknesses in the literature that tests

models of income-pooling. Studies that compare maternal and paternal income effects on demand (for goods, health, or leisure) treat the distribution of income (or non-labor income) within the household as predetermined (Browning, Bourguignon, Chiappori and Lechene, 1993, 1994; Thomas, 1990). Rejection of income-pooling in those studies may simply reflect the role of unobserved heterogeneity in the distribution of income or measurement error in income. By comparing parental income effects on sons relative to daughters, our approach is analogous to a "natural experiment" as long as the heterogeneity is fixed among siblings. Clearly, in the absence of an exogenous shift in the distribution of resources within the household, it will be difficult to provide pure tests of income-pooling with survey data. (See Lundberg, Pollak and Wales, 1995, who creatively exploit a "natural experiment" arising out of a shift in payment of child benefit from men to women in the late 1980s in the United Kingdom.) Note, also, that the fixed effects estimates are robust to measurement error in income (and education) as long as the measurement error is uncorrelated with the gender of the child. Given that certainly income, and probably education, are subject to non-trivial measurement error, we view this as an important additional virtue of our approach.

Since the main effects of paternal and maternal income are subsumed in the household fixed effect, as they are for parents' schooling, it is only possible to determine whether there is a differential impact of income on the educational attainment of a daughter, relative to a son. We follow the same empirical strategy as described above for education and determine whether income effects on sons relative to daughters differ depending on whether the income is in the hands of mothers or fathers. If these "difference-in-differences" of income effects are not zero, we would conclude that mothers and fathers do not pool their income regarding investments in child education.

There are at least two reasons why households may not appear to pool their resources. First, mothers and fathers may not have the same preferences: for example, fathers may get more utility out of investing in their sons. Second, the returns to investments in daughters (and sons) may not be the same for fathers and mothers. For example, a mother may reap a higher return later in life from a daughter,

relative to a son.[3] Rejection of income pooling with the strategy that we follow does not allow us to distinguish between these two mechanisms.

In sum, we conduct four analyses using a rich household survey from Brazil. We start with a comparison of the impact of maternal and paternal education on child educational attainment, taking a broad sweep comparing cohorts born 50 years apart. We then compare the impact of parental education on males and females. Third, we focus on the "differences-in-differences" in the impact of each parent's education on sons relative to daughters. Fourth, we examine "differences-in-differences" in parental income effects to test the income pooling hypothesis; those analyses examine only children because of our need to have multiple respondents who share the same parents and for whom parental income is reported.

3. DATA

The data are drawn from the 1982 *Pesquisa Nacional por Amostra de Domicilios* (PNAD), a very large household labor force survey conducted in Brazil. The PNAD is an annual survey, similar to the Current Population Survey in the United States, covering over 100,000 households and half a million people. Each year, the survey includes a special supplement and, in 1982, its focus was education. In addition to information on the educational attainment of all members in every household, heads and their spouses report the education of their own mothers and fathers, including those who had died. It is unusual for large-scale surveys to contain this information, and we will exploit it to trace out changes in the inter-generational transmission of education across cohorts born over half a century apart, from the 1920s through the 1970s, a period during which there has been dramatic social and economic change in Brazil.

3.1 Trends in completed education of men and women

Given its GDP, educational attainment of the adult population in Brazil is low (Schultz, 1988). It has, however, been increasing rapidly, particularly since the birth cohorts of the 1940s, as is apparent in Figure 1. The upper panel of the figure displays educational attainment of all Brazilians born between 1920 and 1960 and is based on nearly 400,000 individuals from the 1982 PNAD. On average, those born

[3]In the United States, for example, there is some evidence that in old age, mothers tend to have more contact with their daughters relative to their sons. (Hess and Waring, 1978; Spitze and Logan, 1990.)

in 1960 have spent about six years at school, which is more than twice as long as those 35 years their senior. Whereas education rose by about two-thirds of a year each decade among the 1920 to 1940 birth cohorts, it has risen by nearly a full year in each decade since then. A good part of this increase is accounted for by a substantial decline in the fraction of people who have never attended school, as depicted by the dashed line: the rate is about four times higher among those born in 1925 relative to those born in 1960.[4] The proportion of the population that has completed eight years of schooling (which amounts to completing primary school in the current system) has also risen four-fold during these 35 years.[5] (See also Lam and Levison, 1992; Barros and Lam, 1992.) The decline in the number of years of schooling among those born after 1960 reflects the fact that they have not all completed their education.

Rather less attention has been paid in the literature to the fact that the rate of increase in schooling has been faster for women than men, as shown by the lower panel of Figure 1. The gap between men and women in completed years of schooling was about 20% for those born in 1925. By the 1950 birth cohort, the gap had been completely eliminated and, since then, there has been a reversal. Among more recent cohorts, women are actually slightly better educated than men.[6]

In spite of all these changes in educational attainment, considerable regional heterogeneity within Brazil has persisted through to the present. In this paper, we will focus on urban households, distinguishing the South from the Northeast, the poorest region of the country.[7] These two regions made up 95% of the urban Brazilian population in 1982 which, in turn, accounted for 70% of the total population. As an example of the inter-regional gap in educational attainment, for the cohort born in

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[4]41% in the 1925 birth cohort and only 10% in the 1960 birth cohort had no schooling.

[5]The increase was from 7% among the 1925 cohort to 28% among the 1960 cohort.

[6]On average, among those born in 1960, women have completed 6.25 years of schooling, while men have completed about one-third of a year less.

[7]What we are calling the South also includes Central Brazil and comprises Espirito Santo, Minas Gerais, Rio de Janeiro, Sao Paulo, Parana, Rio Grande do Sul, Santa Catarina, Goias, Mato Grosso, Mato Grosso do Sul and the Federal District of Brasilia. The Northeast includes Alagoas, Bahia, Ceara, Maranhao, Paraiba, Pernambuco, Piaui, Rio Grande do Norte, and Sergipe. In the 1982 PNAD, over 65% of the sample of urban households reside in the South and approximately 25% live in the Northeast, with the remaining 10% in the North. The sample sizes are very large: for example, there are over 85,000 heads and spouses aged 25 to 59 in the urban South and over 25,000 in the Northeast.

1940, a person living in the urban South has spent, on average, 5.3 years at school whereas his or her counterpart in the urban Northeast has only completed 3.9 years of education, a difference of about 25%.[8] By the birth cohort of 1960, this gap has declined to 10% (still 0.6 year), although there is evidence (in later surveys) that it has been rising since then.

Not only do schooling levels differ across regions, but so do the differences between men and women. Figure 2 displays educational attainment of men and women in the two urban regions (along with standard errors around each estimate). In the South, women born in the 1920s have spent about 25 to 30% less time at school than males in their cohort, and equality in education was achieved only among those born in the late 1950s. Among more recent cohorts, women are only slightly better educated than men. In the Northeast, the gap between men and women was about the same among the oldest cohorts, but women caught up about a decade earlier and, among the cohort born in 1960, women have spent about 10% more time at school than men. Women, it appears, have done especially well, relative to men, in the poorest region of the country.

In sum, educational attainment in Brazil has increased rapidly over the last half-century, especially among women and in the poorest Northeast of the country; the biggest gains have been enjoyed by women in the Northeast who are now, on average, better educated than males living in that region. There have, therefore, been substantial changes in the relative levels of education of men and women over this period. In the next section, we will use a regression framework to assess the extent to which these changes can be attributed to the role of parental background and, in particular, maternal and paternal education.

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[8]Respondents are stratified on current residence, and so the analyses are likely to be contaminated by inter-regional migration which has tended to be from the Northeast to the South. While migration is certainly important, the large regional gaps are unlikely to be entirely explained by migration, especially since migrants from the Northeast are neither drawn exclusively from the top of the education distribution nor are they entirely male. Unfortunately, with this survey, it is impossible to estimate the extent of the bias in comparing levels of education that is induced by ignoring migration.

4. REGRESSION RESULTS

The regressions draw on information about adults (presented in the last section) and about children. Results are reported in three sections, with each section corresponding to a specific question. We begin by documenting the relative importance of maternal and paternal education. We then demonstrate that the effects of parental education differ between sons and daughters. Finally, focussing on children, we show that mothers' and fathers' incomes differentially affect the education of boys and girls (after controlling for all unobserved heterogeneity that is fixed within the household). We conclude, therefore, that the hypothesis parents pool their incomes is rejected in these data. Before presenting the results, it is important to clarify how our samples are constructed and describe the specification of the empirical model. We do that in the next sub-section.

4.1 Samples and empirical specifications

Attention in the regression analysis is restricted to urban households, and comparisons are drawn between those in the richer South and poorer Northeast of the country. We examine the effects of parental education and income using two samples: adult heads and spouses age 25 through 54, and children age 7 through 18 who are living with their parents. Because these samples do not represent all people in those age categories, they are compared with the entire sample of people included in the survey in Table 1 and graphically in Figure 3. Appendix Table 1 summarizes the characteristics of the analytical samples used in the regressions.

Adults

The analysis sample for adults includes only heads and spouses because no other respondents in the survey provide information about the education of their parents. Among 35 to 54 year olds, our sample contains about 95% of all men and 90% of all women, but the fractions are smaller among younger adults. Education levels of those included and excluded from the analytical sample are very similar except, perhaps, among younger adults (25 to 34 year olds), particularly in the Northeast (Table 1). Young adults who have set up their own households tend to have less schooling than those still living with their parents, or in other arrangements. Our analytical sample includes only those age 25 through

54 years so as to minimize problems associated with sample selectivity due, for example, to mortality among older people and early household formation among the younger.

In the survey, the heads and spouses report the education of their parents in one of seven categories: illiterate, literate, 1-3 years, 4 years, 5-8 years, 9-11 years and 12 years or more. In the education system that prevailed when their parents were of school age, primary school consisted of two levels: an initial four years, followed by an advanced level of four years. This was followed by three years of secondary school.[9] There are very few parents in the sample who have completed more than the upper level of primary school (9 years or more). To avoid problems with leverage points, we have collapsed higher schooling levels into one group (more than 5 years of schooling) and include four categories in each regression with an illiterate parent being the omitted case.

Regressions of years of completed schooling by adults are presented in Table 2 for all adults; analyses stratified into ten-year cohorts are in Appendix Tables 2 and 3. In addition to the estimated effects of maternal and paternal schooling which are reported in the tables, all regressions include controls for age, current state of residence, gender and race; those effects are suppressed from the tables.

Children

The child analysis sample excludes all children who are not related to the head or spouse since it is not possible to (unambiguously) identify the parents of other children from the household roster. Among 7 to 14 year olds, our sample covers about 90% of all children, and they tend to be better educated than those children whose parents are not the head or spouse, although the disparities are very small (Table 1). As children enter adolescence and leave the home, the sample becomes increasingly selected. For example, among 19 to 21 year olds, about three-quarters of males and only one-half of females are living with their parents: many of the latter are still at school, so this sample is better educated than the full sample. This is particularly clear for women. Because of this difference at older ages, we choose to restrict attention to children of the head or spouse who are age 7 to 18, but recognize the

[9]More recently the system has been changed to eight years of primary school, followed by secondary school.

potential for selection bias and thus the need for caution in interpreting the results for older children.[10] All analyses are, therefore, stratified into two age groups: younger children (age 7 through 14) and older children (15 to 18 year olds).

Results are presented for the highest completed grade by each child, controlling for age with a dummy for each year so that the estimates can be interpreted in terms of the grade the child would be expected to have completed. The substance of all of the results carries through when the dependent variable is current enrollment status, so those results are not reported here. Experiments with a range of specifications of parental education suggested a set of dummy variables that pick up the shapes of the parent education-child education relationship and which happens to be consistent with the specification used for the adult samples.[11] We focus first on the impact of parental education, which is reported in Table 3. Household income, paternal income, and maternal income are added to the regressions and the income effects are reported in Table 4. Holding household income constant, the impact of paternal income should be interpreted as the effect of changing the *share* of total household income under his control. The same applies to the interpretation of maternal income.

4.2 Do maternal and paternal education effects differ?

Adults

Parental education is a powerful predictor of own schooling in urban Brazil and the extent of inter-generational transmission of educational attainment is striking. More than 40% of the variation in adult schooling is explained in the regressions and, of this, over 85% is explained by parental education alone.

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[10]For example, of all 17-18 year old women in the South, 10% are non-child relatives of the head, 5% are domestic servants, and the remaining 10% are married and have formed their own households. This third group of women (and also young male heads) can be included in the analyses of parental education since it is reported for all heads and spouses in the survey. The main results are not affected by their inclusion in the sample. However, these young heads cannot be included in the analyses of the impact of parental income (since that is not reported), so we have chosen to maintain a single, consistent sample of children, those living with their parents.

[11]Experiments were conducted with linear, quadratic, cubic forms, splines with knots at 4 and 8 (which correspond to natural breaks in the Brazilian school system), and a series of dummy variable models.

The first column of Table 2 reports the impact of parental education on men and women in the urban South.[12] Relative to having an illiterate mother, an adult with a literate mother will have more than one additional year of education (1.3 years), and if the mother had completed at least five years of schooling, then the respondent will, on average, have stayed at school just over five years longer. The estimated effects in the Northeast are reported in column 5 of the table; they are even higher than in the South, indicating that inter-generational mobility is lower in the poorer Northeast of the country.

Recall, from Figure 1, that educational attainment has increased, on average, by one year in each decade for those born after 1940. The coefficient on age in Table 2 indicates that, after controlling for parents' education, it would take between 15 and 20 years for educational attainment to increase by a year. To put this in perspective, a person whose mother and father are both literate will have more than two years of additional schooling relative to a person both of whose parents are illiterate. Simulating an increase in both parents' education from levels of cohorts born between 1928 and 1937 to levels of cohorts born 20 years later demonstrates that between 33 and 40 percent of the increase in male and female schooling can be so explained.

Many, though certainly not all, studies have demonstrated that maternal education has a bigger impact on child human capital outcomes than that of fathers.[13] This is true in these data as well. For example, in the South, relative to having an illiterate father, an adult whose father is literate will have slightly less than an extra year (0.8) of schooling, which is significantly less than the benefit associated with having a literate mother. Similarly, if the father completed five years of education or more, the child will have spent four additional years at school, whereas adults with mothers who are that well educated tended to stay at school for five more years. In all cases, the impact of paternal education is significantly

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[12]In all regressions, for both adults and children, Breusch-Pagan LM tests reject the assumption that errors are homoskedastic and so all variance-covariance matrices and test statistics based on them have been estimated by the method of the infinitesimal jackknife or White (1980).

[13]For a comprehensive review, see Behrman (1990). A comparison of the impact of maternal and paternal education on wages is presented in, *inter alia*, Behrman and Wolfe (1984), Heckman and Hotz (1986), King and Lillard (1987), King and Bellew (1991), Lam and Schoeni (1993), Strauss and Thomas (1991) and Lillard and Willis (1994). The impact on child mortality is discussed in Caldwell (1979), Mensch, Lentzner and Preston (1985) and Thomas, Strauss and Henriques (1990).

smaller than maternal education. The same pattern emerges in the Northeast.[14] While this fact has often been attributed to the intra-household allocation of time on child care, since women typically bear the lion's share of this burden, as discussed above, it is consistent with several other plausible explanations. We will explore one of those -- that households do not pool their incomes -- in more detail below.

In relative terms, the gap in the impact of maternal and paternal education declines with education of the parent (although the absolute gap increases). For example, in the South, the effect of having a literate mother is nearly 60% bigger than having a literate father (relative to the parent being illiterate); if the parents have completed primary school (five or more years of schooling), then relative to the father, the maternal effect is only 16% higher. There is a similar pattern in the Northeast where the relative effects decline from 50% to 20%. This may be because better educated parents share the child care burden more equally. Alternatively, it might be that the difference in the effectiveness of parental education in the education production function declines with the education level of the parent. Thirdly, it may be that better educated parents have less dispersion in their preferences regarding the education of their children.

Children

The results for children are presented in Table 3. The impact of parental education is reported in column 1 for young children (7-14) and in column 6 for older children (15-18).[15] The education of both parents has a positive and significant influence on the education of their children, particularly among older children. Intergenerational immobility in Brazil apparently begins to manifest itself as children enter their late teens. Relative to having a mother who did not attend school, a 15 to 18 year old child whose mother completed at least five years of education would have completed at least two additional grades in both the South and Northeast. As was the case for adults, the influence of mothers is bigger than that of fathers, with the difference ranging between 30 and 60%; all of these differences are significant.

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[14]The F test statistics for the equality of all four maternal and paternal education effects are 42.6 in the South and 15.2 in the Northeast. Both are significantly different from zero.

[15]The sample is stratified into two age groups in part because of concern about selectivity in our sample of children living with their parents or forming their own households. This is unlikely to be important for the younger age group, as shown in Table 1.

4.3 Does parental education have the same impact on sons and daughters?

Adults

Thus far, we have intentionally ignored the gender-specific effects of parental education: it is to this that we now turn. The regressions in the first column of each panel in Table 2 are re-estimated separately for men and women so that the impact of all covariates is allowed to differ by gender of the respondent; these estimates are reported in the second and third columns in each panel of the table. The difference between the gender-specific estimates are reported in the fourth column.

In general, paternal education has a bigger effect on the schooling of his son, relative to his daughter and these differences are both substantial and significant. This is true in both the South and the Northeast and for all levels of paternal education. For example, relative to having an illiterate father, a daughter in the South with a literate father would have spent three-quarters of a year longer at school. For a son, however, the additional schooling associated with having a literate father is over one-third more than that; this amounts to the son having a full year of additional schooling. While the size of the gap is bigger among fathers at the top of the education distribution (nearly three-quarters of a year in the South), the proportionate difference in the impact on sons and daughters declines with paternal education. One might be led to conclude that these gender specific differences in investments in children decline with wealth (or paternal education) and reflect resource constraints among the poorest (Behrman, Pollak and Taubman, 1982; see also Parrish and Willis, 1993).

However, in the Northeast, the proportionate gap between the effects of paternal education on sons' and daughters' schooling rises with his education, with the gap being (in terms of years of schooling) about a year among adults whose fathers had at least 5 years of education. Resource constraints, it seems, are unlikely to be the whole story.

To dig more deeply into the resource constraint hypothesis, the regressions have been re-estimated for three cohorts of adults: those born in the earliest cohort (age 45-54 in 1982), the middle cohort (age 35-44), and the youngest cohort (age 25-34 in 1982). The results are reported in Appendix Table 2 (for the South) and Appendix Table 3 (for the Northeast). Given growth in *per capita* income, resource constraints are likely to have been more important among the older cohorts, so the difference in the impact

of paternal education should decline reading across the table. Examining coefficients for boys and girls separately, there is no such pattern in the South, and in the Northeast, only among boys of the most highly educated fathers. Among children of the best educated in both the South and Northeast, however, the *differential* impacts on boys *versus* girls do decline across cohorts. Whereas among the oldest cohort, the gap was 1.8 years, among the youngest cohort, it is only 0.6 years. However, if resource constraints are key, they should be most important among the poorest and, with economic growth, the differential impact on sons and daughters should thus decline most among those with less-educated fathers. In fact, the reverse is true: there is an increase in the gender difference for literate fathers in the South and fathers with 1 through 3 years of schooling in the Northeast. In the case of the latter, the gap has increased ten-fold across the three cohorts and is significant only among the most recent cohort. For this to be consistent with a resource constraint hypothesis, it would imply that the poorest have become more resource constrained, especially during the 1950s and 1960s: that seems unlikely.

Unlike for fathers, the evidence for differential effects of maternal education on sons and daughters is weak. Taking all adults together, there are no cases in which maternal education has a substantially (not to mention significantly) bigger effect on the son, and there is only one group for whom the gender gap is significant. Specifically, the education of mothers in the Northeast with 1 to 3 years of schooling has a bigger impact on *daughters*.

As shown in Appendix Tables 2 and 3, in both regions the impact of maternal education has tended to increase for both daughters and sons, but the rate of increase has been faster for daughters (or, put another way, there is declining inter-generational mobility for women in Brazil). Thus, among the most recent cohorts, there is a suggestion that maternal education has a bigger impact on daughters, relative to sons. Indeed, this change in the impacts of mother's schooling can account for 37 percent of the relative increase in female-to-male schooling in the South, between cohorts born in the 1930s and those born in the 1950s.

The F tests at the foot of Table 2 summarize the results: father's education has a significant impact on the education of his sons and his daughters, with the impact on sons being significantly bigger than that on daughters (F=11.18 in the South, 5.13 in the Northeast). Maternal education has a bigger effect

than paternal education (even on sons), but all children seem to benefit equally, irrespective of gender. To test whether sons receive more resources than daughters, we need to assess whether the differential impact of paternal education on sons, relative to daughters, is significantly different from the differential impact of maternal education on her children. This "difference-in-difference" test is the third F test in the fourth column of each panel of Table 2. It is significantly different from zero for both regions.

Children

The conceptual experiment described in Section 2 compares investments in siblings focussing on the choice of each parent to invest in a son rather than a daughter. The analysis thus far has exploited cross-section variation in educational attainment of unrelated adult respondents. Ideally, we want to compare siblings within the same family: for adults, that is impossible in this survey since very few adult siblings are co-resident. For children, however, it is possible to explicitly contrast siblings, and we present two estimates of the differential impact of parental education on the education of their sons and daughters.

The fourth column in each panel of Table 3 reports the child-level analogue of the results for adults in Table 2; those differences are potentially contaminated by household-level unobserved heterogeneity. For example, if fathers are inclined to invest in their sons only if there are more sons than daughters (or if there are no daughters), then, in the cross-section, we would observe a bigger impact of paternal education on boys, but this would have nothing (direct) to do with intra-household resource allocation. Along the same lines, many families have children of only one gender: including them in the analyses will induce noise that is unrelated to the specific hypothesis under scrutiny. Thus, in the fifth column of each panel, the models include a family fixed effect which controls for all unobserved household heterogeneity that is fixed across siblings. These estimates will be consistent unless parental education is correlated with gender-specific characteristics of children. For example, if parents'decisions about fertility are affected by the gender of their children, and the nature of the role of gender in these decisions differs across the education distribution, then the fixed effects estimates will also be biased. This might arise, for example, if low-educated parents want at least one son, whereas better educated parents want both sons and daughters. However, there is rather little evidence for this sort of gender-preference in fertility in Brazil and no evidence that such gender-preference is associated with parental education.

Both mothers and fathers have a significant positive influence on the education of sons and daughters. Although among older children there is a tendency for fathers to have a bigger impact on sons and mothers on daughters, in the models without fixed effects these differences are small and seldom significant, and among younger children there is no pattern at all. However, unobserved household-level heterogeneity does appear to be important: the evidence that maternal and paternal education differentially influences the schooling of boys and girls is substantially stronger in models with fixed effects, especially for the younger children.[16] In the South, parental education has a significantly bigger effect on younger sons. Whereas maternal education has a significantly bigger effect on daughters (of all ages) for mothers who have 1 through 4 years of schooling, there is no evidence for gender-specific investments among well-educated mothers. Paralleling the results for adults, the "difference-in-difference" is also significant, indicating that mothers and fathers invest differentially in their children. If these choices reflect resource constraints, the patterns should be stronger in the Northeast; they are not. There, paternal education tends to have a bigger impact on sons (particularly younger sons), and maternal education has a bigger impact on younger daughters. However, the "difference-in-difference" is not significant among either younger or older children.

Thus, father's education has had a bigger impact on the education of sons for several generations. Maternal education appears to benefit daughters more among the most recent cohorts. This evidence reinforces our conclusion that differential investments in sons and daughters are probably not primarily motivated by resource constraints.

4.4 Income and child educational attainment

To test the income pooling hypothesis, we turn, finally, to examine the impact of household and parental *income* on child education in Table 4. The regressions reported in Table 3 have been re-estimated with three controls for income. In addition to (log) per capita household income, maternal income and

[16]The difference between the OLS and fixed effects estimates is not due to the change in the sample composition; restricting analysis to children with siblings in the sample, but excluding the household fixed effect, yields estimates that are very close to the OLS estimates.

paternal income are included in the regressions.[17] Holding household income constant, the impact of maternal income may be interpreted as the effect of increasing the share that the mother controls. Similarly, paternal income effects may be interpreted as raising his share of the income pie. Parental education, along with all other covariates included in Table 3, is also included in these regressions; since those effects change only slightly, they are not repeated in the table.

There is abundant evidence that income is positively correlated with child human capital outcomes including education and health. This is true in Brazil (see, for example, Barros and Lam, 1992) and, as shown in column 1 of the table, in these data as well. The model which is linear in log household income and parental income provides the simplest summary of the results. We have estimated models that are non-linear in income and find that income effects are smaller at the bottom of the distribution, larger at the top. Conditional on household income, the impact of mother's income is significant only among older children in the Northeast. Father's income effects are also non-linear: his income share matters only among those with low income.

However, we do not dwell on these correlations as their interpretation is not unambiguous because household income, its allocation, and the allocation of time of mothers and fathers between labor supply, child rearing, and other activities are all intimately connected. If these choices are determined simultaneously (or if there is common unobserved heterogeneity in the allocation of resources to child education and time allocation in other dimensions), then the regression estimates will be biased. But, if these choices are made without regard to unobserved gender-specific child-level factors, then they can be treated as common across siblings within a family. Under this admittedly strong assumption, estimated income effects in models that incorporate household fixed effects should be uncontaminated by bias due to simultaneity. Of course, in models that include household fixed effects, it is not possible to say anything about the impact of shifting income shares on levels of child education (which is absorbed in

[17]Household composition is varied and complex in Brazil, and household income is not always the sum of maternal and paternal income. In both the South and the Northeast, on average, fathers account for slightly over 60% of total income, mothers account for about 20%, and the rest is in the hands of other household members (who are typically grandparents, aunts or uncles of the child). Roughly 40% of households report other members with some income.

the fixed effect), but we can test whether income and income shares differentially affect sons and daughters. These fixed effects estimates are presented in column 5 of each panel of Table 4.

In the South, household income tends to have a bigger impact on the education of a daughter, but this is compensated by the fact that if the father has a bigger share, then a son tends to be better educated relative to a daughter. The reverse is true for mothers, but the difference is much smaller and not significant. The "difference-in-difference" in maternal and paternal income effects on sons and daughters is not significant for either age group of children. However, when we allow income effects to be non-linear, the difference-in-difference is significant for younger children living in lower-income households;[18] this is the only case in which the linearity assumption is important.

There is no evidence that income differentially affects educational attainment of older sons and daughters in the Northeast. But among 7 to 14 year olds in the Northeast, income turns out to be quite powerful. Household income has a bigger impact on the educational attainment of daughters, and daughters do much better in households in which mothers have a large share of the income. Sons are better educated if the father has a bigger share of income. The "difference-in-difference" of these income effects is also large and significant. Under the assumptions of the model, we reject the hypothesis of income pooling among mothers and fathers with respect to investments in their children.

Thomas (1990, 1994) presents additional evidence, also from Brazil, which indicates that parents do not pool their incomes. First, relative to paternal non-labor income, maternal non-labor income has a bigger impact on child height, child weight (given height), child survival, and household *per capita* nutrient intake. Second, paternal non-labor income has a bigger impact on the height of a son, relative to a daughter, and the reverse is true for maternal non-labor income. These results also provide insight into the plausibility of a key assumption underlying our tests: that the household fixed effect is uncorrelated with child gender. One reason for failure of that assumption is what we called the "role model" effect: daughters of mothers who are successful in the labor market do better at school than their

[18]The F statistic for the "difference-in-difference" is 19.6 if father's income is less than median; it is 0.18 if father's income is above median. The joint test for equality of maternal and paternal income effects on the difference between the impact on sons and daughters is 11.9.

brothers. But the role model effect is unlikely to explain the differential impact of maternal income on heights of daughters and sons. The analyses of child height focus on children under twelve, and thus their mothers are relatively young; little of their non-labor income will reflect previous labor supply and even less will have been accumulated after the birth of a daughter. It seems unlikely that mothers going to work after the birth of a daughter explains those results. We conclude, therefore, that the weight of the evidence points in the direction that mothers and fathers do not pool incomes in Brazil.

5. CONCLUSIONS

The effect on educational attainment of the mother's schooling is, in general, substantially and significantly greater than that of the father. There is a suggestion that maternal education has a bigger impact on daughters, relative to sons. In contrast, the effects of father's schooling are significantly and substantially greater among sons, relative to daughters, and this difference is apparent among Brazilians born in the 1930s through to the 1950s.

Focusing on the cohort born in the late sixties and seventies, and after controlling for all household-level fixed effects, we find that maternal education has a bigger effect on the education of her daughters relative to her sons, and that paternal education continues to have a bigger impact on sons, relative to daughters. These results may reflect gender-specific technology in human capital production, or parents may not be pooling their incomes.

Paternal income tends to have a bigger effect on the education of a son, relative to a daughter, whereas maternal income appears to be associated with relatively better educated daughters. This "difference-in-differences" is significant. Under the assumption that all household-level unobserved heterogeneity is not correlated with the gender of the child, we reject the hypothesis that parents pool their income. Whether this is because mothers and fathers have different preferences for investment in the education of their children or whether the returns to investing in sons, rather than daughters, differ for fathers and mothers, we cannot say. But it is clear that as the education of females, relative to males, continues to rise in Brazil, there will be more rapid increases in the educational attainment of children, especially daughters.

REFERENCES

Barros, R. and D. Lam. (1992). Income inequality, inequality in education, and children's schooling attainment in Brazil, forthcoming in N. Birdsall, B. Bruns and R. Sabot, *Opportunities Missed: Education, Growth and Inequality in Brazil*, Inter-American Development Bank, Washington D.C.

Becker, G. (1965). A theory of the allocation of time, *Economic Journal*, 75:493-517.

Becker. G. (1974). A theory of social interactions, *Journal of Political Economy*, 82.6:1063-1093.

Becker, G. (1981). *A Treatise on the Family*, Cambridge: Harvard University Press.

Behrman, J. R. (1990). The action of human resources and poverty on one another: What we have yet to learn, Living Standards Measurement Study Working Paper No. 74, World Bank.

Behrman, J. R. (1992). Intrahousehold allocation of nutrients and gender effects: A survey of structural and reduced form estimates, in S.R. Osmani (ed.), *Nutrition and Poverty*, Oxford: Oxford University Press.

Behrman, J. and A. Deolalikar. (1988). Health and Nutrition, in H. Chenery and T.N. Srinivasan (eds.) *Handbook of Development Economics, Volume 1*, Amsterdam: North Holland Press.

Behrman, J., R. Pollak and P. Taubman. (1982). Parental preferences and provision for progeny, *Journal of Political Economy*, 90.1:52-73.

Behrman, J. and B. Wolfe. (1984). The socioeconomic impact of schooling in a developing country, *Review of Economics and Statistics*, 66.2:296-303.

Ben-Porath, Y. (1967). The production of human capital and the life-cycle of earnings, *Journal of Political Economy*, 75:352-365.

Blau, P. and O. D. Duncan (1967). *The American Occupational Structure*, New York: John Wiley.

Browning, M., F. Bourguignon, P.-A. Chiappori, and V. Lechene (1993). Intrahousehold allocation of consumption: Some evidence on French data, *Annales d'Economie et de Statistique*, 29:137-56.

Browning, M., F. Bourguignon, P.-A. Chiappori, and V. Lechene (1994). Income and outcomes: A structural model of within household allocation, *Journal of Political Economy*, 102.6:1069-96.

Caldwell, John C. (1979). Education as a factor in mortality decline: An examination of Nigerian data, *Population Studies*, 33.3:395-413.

Chiappori, P-A. (1988). Rational household labor supply, *Econometrica*, 56.1:63-89.

Chiappori, P-A. (1992). Collective labor supply and welfare, *Journal of Political Economy*, 100.3:437-467.

Das Gupta, M. (1987). Selective discrimination against female children in India, *Population and Development Review*, 13.1:77-100.

Das Gupta, M. (1994). Femal autonomy over the lifecycle and demographic outcomes. Mimeo, Harvard University.

de Tray, D. (1988). Government policy, household behavior and the distribution of schooling: A case study of Malaysia, in T. P. Schultz (ed.), *Research in Population Economics, Volume 6*, Greenwich Ct.: JAI Press.

Durkheim, E. (1933). *The Division of Labor in Society*, Translated by G. Simpson from *De la Division de la Travail Social: Etudes sur l'Organisation des Societes Superieures* (1893), London: MacMillan.

Featherman, D. and R. Hauser. (1978). *Opportunity and Change*, New York: Academic Press.

Heckman, J. and J. Hotz. (1986). An investigation of the labor market earnings of Panamanian males: Evaluating the sources of inequality, *Journal of Human Resources*, 21.4:507-542.

Hess, B., and J. Waring. (1978). Parent and Child in Later Life: Rethinking the Relationships, in Richard Lerner and Graham Spanier, *Child Influences on Marital and Family Interactions: A Life-Span Perspective*, 241-73, New York: Academic Press.

King, E. and R. Bellew. (1991). Gains in the education of Peruvian women, 1940 to 1980, in Barbara K. Herz and Shahidur R. Khandker (eds.), Women's Work, Education and Family Welfare in Peru, World Bank Discussion Paper No. 116, World Bank.

King, E. and L. Lillard. (1987). Education policy and schooling attainment in Malaysia and the Philippines, *Economics of Education Review*, 6.2:167-181.

Lam, D. (1992). Intergenerational educational mobility in Brazil. Mimeo, University of Michigan.

Lam, D. and D. Levison. (1992). Declining inequality in schooling in Brazil and its effects on inequality in earnings. *Journal of Development Economics*, 37:199-225.

Lam, D. and R. Schoeni. (1993). Effects of family background on earnings and returns to schooling: Evidence from Brazil. *Journal of Political Economy*, 101.4:710-41.

Leibowitz, A. (1974). Home investments in children, in T. W. Schultz (ed.), *Economics of the Family: Marriage, Children and Human Capital*, Chicago: University of Chicago Press.

Lillard, L. and R. Willis. (1994). Intergenerational educational mobility: Effects of family and state in Malaysia, *Journal of Human Resources*, 29.4:1126-1166.

Lundberg, S. and R. Pollak. (1993). Separate spheres bargaining and the marriage market, *Journal of Political Economy*, 101.6:988-1010.

Lundberg, S., R. Pollak and T. Wales. (1995). Do husbands and wives pool their resources: Evidence from the UK child benefit, mimeo, Department of Economics, University of Washington.

McElroy, M. (1990). The empirical content of Nash-bargained household behavior, *Journal of Human Resources*, 25.4:559-583.

Mensch, B., H. Lentzner and S. Preston. (1985). Socio-economic differentials in child mortality in developing countries, ST/ESA/SER.A/97, Department of International Economic and Social Affairs, United Nations, New York.

Morgan, S. P., D. Lye, and G. Condran. (1988). Sons, daughters and the risk of marital disruption, *American Journal of Sociology*, 94.1:110-29.

Parish, W. L. and R. J. Willis. (1993). Daughters, education and family budgets: Taiwan experiences, *Journal of Human Resources*, 28.4:863-898.

Schultz, T. P. (1988). Education investments and returns, in H. Chenery and T.N. Srinivasan (eds.), *Handbook of Development Economics, Volume 1*, Amsterdam: North Holland Press.

Schultz, T. P. (1990). Testing the neoclassical model of family labor supply and fertility, *Journal of Human Resources*, 25.4:599-634.

Sen, A. (1990). More than 100 million women are missing. *New York REview of Books*, 37.20:61-66.

Solon, G. (1992). Intergenerational income mobility in the United States. *American Economic Review*, 82.3:393-408.

Spitze, G. and J. Logan (1990). Sons, daughters and intergenerational social support, *Journal of Marriage and the Family*, 52:420-30.

Strauss, J. and D. Thomas. (1991). Wages, schooling and background: Investments in men and women in urban Brazil, in N. Birdsall, B. Bruns and R. Sabot, (eds.), *Opportunities Missed: Education, Growth and Inequality in Brazil*, Inter-American Development Bank, Washington D.C, forthcoming.

Thomas, D. (1990). Intra-household resource allocation: An inferential approach. *Journal of Human Resources*, 25.4:635-664.

Thomas, D. (1992). The distribution of income and expenditure within the household, *Annals of Economics and Statistics*, 29:109-36.

Thomas, D. (1994). Like father, like son; like mother, like daughter, *Journal of Human Resources*, 29.4:950-89.

Thomas, D., J. Strauss and M.-H. Henriques (1990). Child survival, height for age and household characteristics in Brazil, *Journal of Development Economics*, 33.2:197-234.

White, H. (1980). A heteroskedasticity-consistent covariance estimator and a direct test for heteroskedasticity, *Econometrica*, 48.4:817-838.

Willis, R. (1986). Wage determinants: A survey and reinterpretation of human capital earnings functions, in O. Ashenfelter and R. Layard, (eds.), *Handbook of Labor Economics*, Amsterdam: North Holland Press.

Zimmerman, D. (1992). Regression toward mediocrity in economic stature, *American Economic Review*, 82.3:409-429.

Table 1
Years of completed schooling by children of and head/spouse of household
Comparison of analytical sample to full sample

	Age	MALE Analysis sample # obs	Mean	All sample % obs	Rel educ	FEMALE Analysis sample # obs	Mean	All sample % obs	Rel educ	DIFFERENCE Anal. sample Male-Female
SOUTH										
Children	7-8	4431	0.25	92	1.02	4426	0.31	93	1.01	-0.06
			(0.01)				(0.01)			(0.01)
	9-11	6686	1.80	94	1.01	6433	2.01	92	1.01	-0.31
			(0.02)				(0.02)			(0.02)
	12-14	6547	3.80	94	1.01	6456	4.12	91	1.02	-0.32
			(0.02)				(0.02)			(0.03)
	15-16	4257	5.38	92	1.01	4130	5.66	83	1.04	-0.28
			(0.03)				(0.03)			(0.05)
	17-18	4430	6.29	88	1.02	3792	6.98	73	1.07	-0.69
			(0.04)				(0.04)			(0.06)
	19-21	5128	7.23	75	1.04	3949	8.06	54	1.14	-0.83
			(0.05)				(0.05)			(0.08)
	22-24	3522	7.56	52	1.08	2491	8.58	34	1.21	-1.02
			(0.07)				(0.07)			(0.10)
Adults	25-29	6492	6.71	65	0.97	7785	6.51	71	0.95	0.20
			(0.05)				(0.05)			(0.07)
	30-34	7347	6.61	85	1.01	7501	6.05	83	0.97	0.56
			(0.05)				(0.05)			(0.07)
	35-39	6063	6.29	91	1.01	6446	5.34	89	0.98	0.95
			(0.06)				(0.05)			(0.08)
	40-44	5397	5.61	94	1.01	5497	4.76	90	0.99	0.85
			(0.06)				(0.06)			(0.08)
	45-49	4573	5.18	95	1.00	4814	4.23	91	1.00	0.95
			(0.07)				(0.06)			(0.09)
	50-54	4045	4.87	95	1.01	3944	3.80	89	1.00	1.07
			(0.07)				(0.06)			(0.09)
	55-60	3601	4.28	96	1.01	3647	3.52	86	1.02	0.76
			(0.07)				(0.06)			(0.09)
	>60	5205	3.80	91	1.03	4905	2.93	68	1.08	0.87
			(0.06)				(0.05)			(0.08)
NORTHEAST										
Children	7-8	2128	0.17	91	1.02	2094	0.22	90	1.00	-0.05
			(0.01)				(0.01)			(0.01)
	9-11	3040	1.14	91	1.00	3076	1.35	89	1.02	-0.21
			(0.02)				(0.02)			(0.03)
	12-14	3079	2.58	90	1.01	2936	3.13	84	1.04	-0.55
			(0.03)				(0.04)			(0.05)
	15-16	1871	3.86	90	1.01	1832	4.76	74	1.08	-0.90
			(0.06)				(0.06)			(0.08)
	17-18	1906	5.00	87	1.01	1624	6.06	67	1.11	-1.06
			(0.07)				(0.07)			(0.10)
	19-21	1922	6.04	74	1.05	1604	7.30	52	1.18	-1.26
			(0.08)				(0.09)			(0.12)
	22-24	1217	6.72	51	1.11	1098	8.08	38	1.26	-1.36
			(0.12)				(0.12)			(0.17)
Adults	25-29	2003	5.58	63	0.93	2487	5.59	64	0.90	-0.01
			(0.10)				(0.10)			(0.13)
	30-34	2291	5.20	83	0.97	2628	5.19	80	0.93	0.01
			(0.10)				(0.09)			(0.13)
	35-39	2059	4.93	91	1.01	2231	4.21	85	0.96	0.62
			(0.10)				(0.09)			(0.13)
	40-44	1877	4.14	93	1.01	2019	3.70	88	0.97	0.44
			(0.10)				(0.09)			(0.13)
	45-49	1398	3.80	96	1.00	1671	3.23	89	0.98	0.67
			(0.11)				(0.09)			(0.14)
	50-54	1324	3.39	96	1.00	1499	3.12	89	1.00	0.27
			(0.11)				(0.09)			(0.14)
	55-60	1353	3.46	96	1.02	1376	2.64	84	1.01	0.82
			(0.11)				(0.09)			(0.15)
	>60	2096	2.26	92	1.02	2010	1.93	67	1.02	0.33
			(0.08)				(0.06)			(0.10)

Notes: Analysis sample contains children of head or spouse and adult heads or spouses; relative education is mean education of analysis sample to sample of all people in each age group. 19-24 year olds and >60 year olds excluded from analysis. Standard errors in parentheses.

Table 2: Effect of parental education on years of completed schooling of adults age 25-54

	SOUTH				NORTHEAST			
	All (1)	Males (2)	Females (3)	Difference (4)	All (1)	Males (2)	Females (3)	Difference (4)
Father's education: (1) if								
Literate	0.842	0.987	0.720	0.267	0.880	0.941	0.825	0.115
	[25.82]	[19.86]	[16.84]	[4.08]	[21.54]	[15.29]	[15.18]	[1.41]
1-3 years	1.249	1.353	1.156	0.198	1.851	2.037	1.713	0.323
	[38.74]	[27.30]	[27.50]	[3.04]	[30.64]	[21.15]	[22.29]	[2.63]
4 years	2.452	2.681	2.257	0.424	3.474	3.826	3.193	0.633
	[56.18]	[39.09]	[40.35]	[4.79]	[34.01]	[24.28]	[23.95]	[3.07]
≥5 years	4.470	4.849	4.143	0.707	4.753	5.290	4.278	1.012
	[66.13]	[47.63]	[46.21]	[5.21]	[34.32]	[24.97]	[23.76]	[3.64]
Mother's education: (1) if								
Literate	1.320	1.277	1.356	-0.079	1.338	1.360	1.313	0.047
	[36.69]	[23.86]	[28.09]	[1.09]	[28.57]	[19.31]	[21.04]	[0.50]
1-3 years	1.777	1.715	1.831	-0.116	2.336	2.174	2.447	-0.272
	[50.64]	[32.11]	[39.60]	[1.64]	[34.67]	[20.83]	[27.89]	[2.00]
4 years	3.124	3.143	3.096	0.047	4.049	3.941	4.129	-0.188
	[68.21]	[44.15]	[52.22]	[0.51]	[38.00]	[23.38]	[30.28]	[0.87]
≥5 years	5.170	5.146	5.163	-0.017	5.695	5.700	5.669	0.031
	[71.36]	[47.77]	[53.06]	[0.12]	[39.65]	[25.99]	[30.39]	[0.11]
Respondent	-0.063	-0.052	-0.074	0.022	-0.051	-0.043	-0.058	0.015
Age (years)	[51.10]	[27.86]	[45.06]	[9.01]	[29.78]	[16.75]	[25.54]	[4.39]
(1) if male	0.662	.	.	-0.287	0.159	.	.	-0.469
	[30.31]			[2.31]	[5.25]			[3.03]
F tests for joint significance								
Father's educn	1460.77	730.61	738.57	11.18	601.45	300.00	304.01	5.13
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Mother's educn	2115.37	887.38	1246.63	1.11	826.16	330.57	505.47	1.33
	[0.00]	[0.00]	[0.00]	[0.35]	[0.00]	[0.00]	[0.00]	[0.26]
F tests for equality								
Father = mother education	40.34	7.32	40.68	4.66	15.01	4.01	14.41	2.61
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.03]
R^2	0.47	0.46	0.48	0.47	0.49	0.48	0.50	0.49
Sample size	84349	41233	43116	84349	37054	17617	19437	37054

Notes: [t statistics] below coefficient estiamtes; [p values] below F test statistics; variance-covariances estimated by method of infinitesimal jackknife.

Table 3: Effect of parental education on years of completed schooling of children age 7-18

		YOUNGER CHILDREN (Age 7-14)					OLDER CHILDREN (Age 15-18)				
		All Children (1)	Male (2)	Female (3)	Difference Male-Female (4)	Fixed Effects (5)	All Children (1)	Male (2)	Female (3)	Difference Male-Female (4)	Fixed Effects (5)
SOUTH											
Father's education	1-3 years	0.257	0.251	0.268	-0.017	0.151	0.501	0.523	0.488	0.034	0.088
		[11.89]	[8.24]	[8.87]	[0.40]	[3.21]	[9.10]	[6.89]	[6.17]	[0.31]	[1.05]
	4 years	0.410	0.420	0.403	0.017	0.284	1.071	1.123	1.031	0.092	0.007
		[18.50]	[13.23]	[13.23]	[0.39]	[5.41]	[18.75]	[14.16]	[12.67]	[0.81]	[0.08]
	≥ 5 years	0.640	0.636	0.643	-0.006	0.215	1.509	1.613	1.406	0.207	-0.121
		[27.53]	[18.89]	[20.34]	[0.13]	[3.64]	[24.78]	[19.26]	[16.09]	[1.71]	[1.16]
Mother's education	1-3 years	0.339	0.291	0.386	-0.095	-0.146	0.844	0.822	0.842	-0.019	-0.164
		[17.21]	[10.60]	[13.81]	[2.43]	[3.15]	[17.03]	[12.14]	[11.67]	[0.19]	[1.88]
	4 years	0.639	0.630	0.646	-0.016	-0.105	1.559	1.476	1.628	-0.153	-0.231
		[31.15]	[21.64]	[22.56]	[0.40]	[1.95]	[29.62]	[20.64]	[21.23]	[1.45]	[2.46]
	≥ 5 years	0.907	0.901	0.916	-0.016	0.008	2.343	2.243	2.413	-0.170	-0.019
		[40.91]	[28.41]	[29.87]	[0.36]	[0.12]	[40.34]	[28.01]	[29.01]	[1.47]	[0.17]
F(Father educ=0)		270.51	128.85	146.12	0.31	10.86	231.60	140.52	97.79	1.16	1.20
		[0.00]	[0.00]	[0.00]	[0.82]	[0.00]	[0.00]	[0.00]	[0.00]	[0.32]	[0.31]
F(Mother educ=0)		615.22	305.98	319.88	2.86	4.51	584.37	283.43	302.90	1.26	2.85
		[0.00]	[0.00]	[0.00]	[0.04]	[0.00]	[0.00]	[0.00]	[0.00]	[0.29]	[0.04]
F(Father=Mother educ)		21.50	11.43	11.28	0.54	16.30	19.73	9.93	11.46	3.20	3.21
		[0.00]	[0.00]	[0.00]	[0.58]	[0.00]	[0.00]	[0.00]	[0.00]	[0.04]	[0.04]
R^2		0.68	0.66	0.70	0.68	0.78	0.341	0.330	0.363	0.351	0.902
Sample size		34979	17664	17315	34979	25076	16609	8687	7922	16609	9067
NORTHEAST											
Father's education	1-3 years	0.237	0.260	0.207	0.054	0.199	0.553	0.742	0.365	0.377	0.267
		[8.98]	[7.17]	[5.56]	[1.03]	[3.44]	[6.49]	[6.39]	[3.01]	[2.25]	[1.89]
	4 years	0.424	0.395	0.447	-0.052	0.076	1.203	1.321	1.063	0.259	0.395
		[12.09]	[8.06]	[9.22]	[0.75]	[0.98]	[12.08]	[9.61]	[7.65]	[1.32]	[2.16]
	≥ 5 years	0.615	0.659	0.558	0.101	0.167	1.611	1.779	1.409	0.370	0.253
		[19.20]	[14.79]	[12.43]	[1.60]	[2.23]	[17.15]	[13.46]	[10.94]	[2.01]	[1.63]
Mother's education	1-3 years	0.326	0.301	0.360	-0.060	-0.073	1.125	1.235	0.999	0.236	-0.060
		[12.65]	[8.48]	[9.90]	[1.17]	[1.30]	[14.33]	[11.68]	[8.93]	[1.53]	[0.41]
	4 years	0.569	0.588	0.556	0.032	-0.104	1.645	1.674	1.501	0.173	0.147
		[18.46]	[13.35]	[13.16]	[0.52]	[1.48]	[18.55]	[13.43]	[12.30]	[0.99]	[0.95]
	≥ 5 years	1.008	0.980	1.056	-0.077	-0.169	2.602	2.798	2.346	0.453	0.044
		[32.60]	[23.13]	[24.01]	[1.25]	[2.28]	[29.03]	[22.21]	[18.96]	[2.56]	[0.27]
F(Father educ=0)		132.56	76.30	59.31	1.75	4.55	111.11	69.05	47.07	2.14	2.34
		[0.00]	[0.00]	[0.00]	[0.15]	[0.00]	[0.00]	[0.00]	[0.00]	[0.09]	[0.07]
F(Mother educ=0)		369.80	188.94	197.37	1.30	2.04	300.19	177.50	126.20	2.27	0.55
		[0.00]	[0.00]	[0.00]	[0.27]	[0.11]	[0.00]	[0.00]	[0.00]	[0.08]	[0.65]
F(Father=mother educ)		17.61	7.16	14.50	0.03	2.05	14.16	7.31	7.03	0.03	2.05
		[0.00]	[0.00]	[0.00]	[0.97]	[0.13]	[0.00]	[0.00]	[0.00]	[0.97]	[0.13]
R^2		0.52	0.49	0.57	0.54	0.74	0.327	0.348	0.322	0.354	0.890
Sample size		16353	8247	8106	16353	13002	7233	3777	3456	7233	4429

Table 4: Effect of household and parental income on years of completed schooling of children age 7-18

	YOUNGER CHILDREN (Age 7-14)					OLDER CHILDREN (Age 15-18)				
	All Children (1)	Male (2)	Female (3)	Difference Male-Female (4)	Fixed Effects (5)	All Children (1)	Male (2)	Female (3)	Difference Male-Female (4)	Fixed Effects (5)
SOUTH										
ln(household income)	0.256	0.255	0.253	0.002	-0.185	0.704	0.666	0.730	-0.064	-0.042
	[22.68]	[16.39]	[15.55]	[0.09]	[5.69]	[27.52]	[18.76]	[20.01]	[1.26]	[0.85]
Father's income	0.102	0.164	0.064	0.100	0.636	-0.092	0.256	-0.361	0.617	0.763
	[1.56]	[1.81]	[0.67]	[0.76]	[2.68]	[0.75]	[1.47]	[2.11]	[2.53]	[2.49]
Mother's income	-0.085	0.033	-0.246	0.280	-0.180	0.547	0.466	0.497	-0.031	-0.238
	[0.76]	[0.26]	[1.10]	[1.08]	[0.29]	[1.05]	[0.64]	[0.68]	[0.03]	[0.28]
F statistics for joint significance										
Total & Father income	454.25	237.90	216.13	0.54	16.30	508.11	265.38	249.03	3.20	3.21
	[0.00]	[0.00]	[0.00]	[0.58]	[0.00]	[0.00]	[0.00]	[0.00]	[0.04]	[0.04]
Total & Mother income	280.18	149.08	131.70	0.69	17.87	437.02	201.64	232.91	0.91	0.52
	[0.00]	[0.00]	[0.00]	[0.50]	[0.00]	[0.00]	[0.00]	[0.00]	[0.40]	[0.59]
F statistic for equality										
Father=Mother income	2.33	0.75	1.81	0.43	1.53	1.49	0.08	1.37	0.39	1.39
	[0.13]	[0.39]	[0.18]	[0.51]	[0.22]	[0.22]	[0.78]	[0.24]	[0.53]	[0.24]
R^2	0.69	0.67	0.71	0.69	0.78	0.383	0.372	0.405	0.393	0.902
NORTHEAST										
ln(household income)	0.320	0.297	0.336	-0.040	-0.232	0.723	0.711	0.691	0.020	0.024
	[18.91]	[12.36]	[14.32]	[1.18]	[6.02]	[17.31]	[12.66]	[11.49]	[0.25]	[0.27]
Father's income	0.023	0.360	-0.310	0.670	1.909	-0.475	-0.375	-0.331	-0.044	0.891
	[0.14]	[1.50]	[1.32]	[2.00]	[4.28]	[1.68]	[0.98]	[0.78]	[0.08]	[1.42]
Mother's income	0.126	-0.116	0.365	-0.482	-3.096	2.230	1.380	3.429	-2.050	2.249
	[0.29]	[0.18]	[0.65]	[0.57]	[2.40]	[2.41]	[1.04]	[2.75]	[1.13]	[1.15]
F statistics for joint significance										
Total & Father income	262.61	124.68	137.84	1.99	18.96	176.64	92.30	83.96	0.03	2.05
	[0.00]	[0.00]	[0.00]	[0.14]	[0.00]	[0.00]	[0.00]	[0.00]	[0.97]	[0.13]
Total & Mother income	206.02	85.92	119.13	1.23	25.99	186.41	95.23	92.76	0.64	0.91
	[0.00]	[0.00]	[0.00]	[0.29]	[0.00]	[0.00]	[0.00]	[0.00]	[0.53]	[0.40]
F statistic for equality										
Father=Mother income	0.05	0.53	1.31	1.71	13.30	8.42	1.77	8.98	1.21	0.48
	[0.82]	[0.47]	[0.25]	[0.19]	[0.00]	[0.00]	[0.18]	[0.00]	[0.27]	[0.49]
R^2	0.54	0.51	0.59	0.55	0.74	0.368	0.385	0.365	0.392	0.890

Appendix Table 1: Means and [standard errors] of key variables

	South			Northeast		
Respondent:	Children		Adults	Children		Adults
Age:	7-14	15-18	25-54	7-14	15-18	25-54
Respondent characteristics						
Years of education						
All	2.25	6.06	5.13	1.56	4.88	3.29
	[0.01]	[0.02]	[0.01]	[0.01]	[0.03]	[0.02]
Males	2.15	5.85	5.41	1.43	4.43	3.34
	[0.01]	[0.03]	[0.02]	[0.02]	[0.05]	[0.03]
Females	2.36	6.30	4.86	1.70	5.37	3.25
	[0.02]	[0.03]	[0.02]	[0.02]	[0.05]	[0.03]
Fraction male	0.50	0.52	0.49	0.50	0.52	0.48
Age	10.48	16.48	38.12	10.45	16.47	38.50
	[0.01]	[0.01]	[0.03]	[0.02]	[0.01]	[0.04]
Family characteristics						
Parents' education						
Father						
Years completed	4.64	4.28	.	3.28	3.27	.
	[0.02]	[0.03]		[0.03]	[0.05]	
(1) if father literate	.	.	0.16	.	.	0.21
1-3 years	0.23	0.22	0.21	0.22	0.20	0.13
4 years	0.21	0.20	0.19	0.11	0.12	0.07
>= 5 years	0.29	0.24	0.09	0.22	0.20	0.05
educ missing	.	.	0.07	.	.	0.08
Mother						
Years completed	4.05	3.68	.	3.20	3.05	.
	[0.02]	[0.03]		[0.03]	[0.04]	
(1) if mother literate	.	.	0.13	.	.	0.17
1-3 years	0.27	0.27	0.18	0.25	0.24	0.11
4 years	0.23	0.23	0.17	0.15	0.15	0.07
>= 5 years	0.28	0.24	0.07	0.25	0.24	0.04
educ missing	.	.	0.05	.	.	0.06
Income (Cr$1000s)						
Household income	105.60	118.42	.	68.75	81.11	.
	[0.78]	[1.20]		[0.79]	[1.40]	
Father's income	75.50	71.46	.	47.18	45.72	.
	[0.65]	[1.01]		[0.66]	[1.13]	
Mother's income	15.32	16.30	.	10.18	11.55	.
	[0.24]	[0.32]		[0.21]	[0.35]	
Fraction report income						
Fathers	0.85	0.76	.	0.80	0.70	.
Mothers	0.41	0.44	.	0.42	0.44	.
Others	0.31	0.53	.	0.33	0.52	.
Sample size	34,979	16,609	84,349	16,353	7,233	37,054

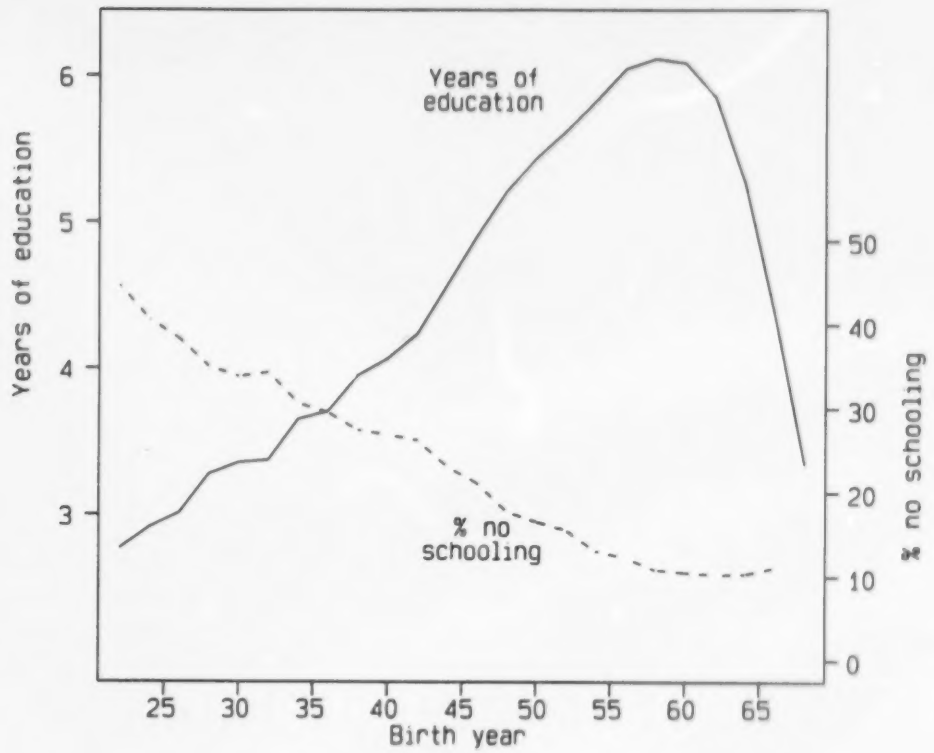
Appendix Table 2: Effect of parental education on years of completed schooling of adults by birth cohort
SOUTH

Birth Cohort:	1928-37				1938-47				1948-57			
Age in 1982	45-54				35-44				25-34			
	All	Male	Female	Diff	All	Male	Female	Diff	All	Male	Female	Diff
Father's education: (1) if												
Literate	0.810	0.897	0.720	0.176	0.978	1.133	0.841	0.292	0.774	0.940	0.632	0.308
	[14.14]	[9.98]	[9.94]	[1.53]	[16.92]	[12.77]	[11.24]	[2.51]	[14.30]	[11.64]	[8.70]	[2.84]
1-3 years	1.056	1.163	0.951	0.212	1.315	1.492	1.150	0.343	1.327	1.365	1.295	0.071
	[17.21]	[12.57]	[11.77]	[1.73]	[23.30]	[17.01]	[15.93]	[3.02]	[25.83]	[17.23]	[19.25]	[0.68]
4 years	2.264	2.420	2.112	0.309	2.641	2.981	2.328	0.653	2.450	2.612	2.322	0.290
	[26.66]	[18.07]	[19.67]	[1.80]	[32.65]	[23.00]	[22.96]	[3.97]	[37.28]	[25.70]	[27.07]	[2.18]
≥ 5 years	4.513	4.936	4.104	0.832	4.569	5.025	4.170	0.854	4.420	4.677	4.209	0.468
	[31.42]	[22.82]	[21.70]	[2.90]	[37.17]	[26.88]	[25.87]	[3.46]	[45.37]	[32.37]	[31.95]	[2.39]
Mother's education: (1) if												
Literate	1.248	1.316	1.187	0.130	1.212	1.121	1.287	-0.166	1.475	1.373	1.561	-0.188
	[19.50]	[13.37]	[14.45]	[1.01]	[19.08]	[11.82]	[15.18]	[1.31]	[24.98]	[15.96]	[19.21]	[1.59]
1-3 years	1.677	1.571	1.770	-0.199	1.839	1.699	1.962	-0.263	1.797	1.788	1.802	-0.014
	[23.76]	[14.79]	[18.88]	[1.41]	[29.47]	[17.66]	[24.27]	[2.10]	[33.85]	[22.21]	[25.59]	[0.13]
4 years	2.995	3.280	2.730	0.550	3.243	3.244	3.235	0.009	3.106	2.988	3.191	-0.203
	[31.60]	[22.15]	[22.63]	[2.88]	[37.99]	[24.21]	[29.59]	[0.05]	[47.05]	[29.53]	[36.74]	[1.52]
≥ 5 years	4.658	4.902	4.405	0.497	5.308	5.342	5.208	0.134	5.300	5.128	5.441	-0.313
	[28.42]	[20.20]	[20.11]	[1.52]	[39.74]	[26.77]	[29.26]	[0.50]	[52.59]	[34.57]	[39.61]	[1.55]
Respondent's age	-0.061	-0.066	-0.057	-0.009	-0.077	-0.079	-0.075	-0.004	-0.034	-0.010	-0.057	0.047
(in years)	[9.67]	[6.92]	[6.81]	[0.74]	[11.30]	[7.75]	[8.31]	[0.29]	[5.63]	[1.07]	[6.85]	[3.81]
F tests for joint significance of												
Father's educ	352.81	176.91	178.56	2.80	495.83	251.50	247.35	6.30	630.98	307.13	327.10	3.25
	[0.00]	[0.00]	[0.00]	[0.02]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]
Mother's educ	455.33	215.16	245.88	3.42	664.89	268.78	412.01	1.59	1009.81	412.14	600.18	1.36
	[0.00]	[0.00]	[0.00]	[0.01]	[0.00]	[0.00]	[0.00]	[0.18]	[0.00]	[0.00]	[0.00]	[0.25]
F test for equality of												
Father=mother	13.49	5.29	9.91	1.31	9.53	0.68	14.58	3.43	21.66	4.15	20.91	2.94
education	[0.00]	[0.00]	[0.00]	[0.26]	[0.00]	[0.60]	[0.00]	[0.01]	[0.00]	[0.00]	[0.00]	[0.02]
R^2	0.44	0.44	0.44	0.45	0.46	0.46	0.46	0.46	0.45	0.44	0.47	0.45
Sample size	22571	1130	11271	22571	27685	13677	14008	27685	34093	16256	17837	34093

Appendix Table 3: Effect of parental education on years of completed schooling of adults by birth cohort
NORTHEAST

Birth Cohort:	1928-37				1938-47				1948-57			
Age in 1982	45-54				35-44				25-34			
	All	Male	Female	Diff	All	Male	Female	Diff	All	Male	Female	Diff
Father's education: (1) if												
Literate	0.751	0.745	0.748	-0.002	0.852	0.952	0.759	0.193	1.013	1.085	0.953	0.132
	[11.38]	[7.26]	[8.88]	[0.02]	[12.53]	[9.26]	[8.43]	[1.41]	[13.79]	[9.99]	[9.56]	[0.90]
1-3 years	1.360	1.381	1.324	0.057	1.868	1.984	1.788	0.196	2.129	2.479	1.885	0.594
	[12.73]	[8.20]	[9.65]	[0.26]	[17.58]	[11.72]	[13.28]	[0.91]	[21.92]	[15.92]	[15.30]	[2.99]
4 years	3.116	3.554	2.763	0.791	3.682	4.254	3.203	1.051	3.561	3.724	3.450	0.273
	[14.93]	[10.81]	[10.46]	[1.88]	[20.35]	[15.17]	[13.77]	[2.89]	[23.26]	[15.97]	[16.99]	[0.88]
≥ 5 years	5.035	5.947	4.113	1.835	4.964	5.571	4.378	1.193	4.536	4.858	4.308	0.550
	[16.52]	[12.19]	[11.03]	[2.99]	[19.73]	[14.86]	[13.24]	[2.39]	[23.13]	[16.51]	[16.41]	[1.40]
Mother's education: (1) if												
Literate	1.085	1.109	1.064	0.045	1.357	1.399	1.325	0.074	1.506	1.516	1.493	0.023
	[13.69]	[9.23]	[10.20]	[0.29]	[17.25]	[11.62]	[12.83]	[0.47]	[18.66]	[12.71]	[13.66]	[0.14]
1-3 years	2.317	2.309	2.352	-0.043	2.368	2.252	2.440	-0.188	2.347	2.069	2.528	-0.459
	[17.72]	[11.56]	[13.79]	[0.17]	[19.75]	[12.13]	[15.68]	[0.78]	[22.81]	[12.89]	[18.94]	[2.20]
4 years	3.768	3.699	3.821	-0.122	3.982	3.748	4.155	-0.406	4.237	4.159	4.284	-0.125
	[16.88]	[9.88]	[14.09]	[0.26]	[20.87]	[12.59]	[16.98]	[1.05]	[27.11]	[17.15]	[21]	[0.39]
≥ 5 years	4.946	4.796	5.098	-0.301	5.758	5.783	5.618	0.164	5.960	5.961	5.932	0.029
	[15.25]	[9.34]	[12.54]	[0.46]	[21.51]	[14.78]	[15.76]	[0.31]	[30.05]	[19.62]	[22.78]	[0.07]
Respondent's age	-0.037	-0.028	-0.046	0.018	-0.057	-0.066	-0.048	-0.018	-0.021	-0.014	-0.028	0.014
(in years)	[4.79]	[2.29]	[4.70]	[1.17]	[6.40]	[4.98]	[4.07]	[1.02]	[2.29]	[1.02]	[2.19]	[0.74]
F tests for joint significance of												
Father's educ	136.42	66.04	70.13	2.48	209.87	108.98	103.15	2.92	264.98	131.91	135.81	2.43
	[0.00]	[0.00]	[0.00]	[0.04]	[0.00]	[0.00]	[0.00]	[0.02]	[0.00]	[0.00]	[0.00]	[0.05]
Mother's educ	185.14	74.01	117.38	0.08	266.65	109.47	159.98	0.61	388.64	155.11	236.58	1.34
	[0.00]	[0.00]	[0.00]	[0.99]	[0.00]	[0.00]	[0.00]	[0.65]	[0.00]	[0.00]	[0.00]	[0.25]
F test for equality of												
Father=mother	7.57	3.74	5.05	0.89	5.80	2.16	5.10	1.24	6.95	3.63	5.77	2.34
education	[0.00]	[0.00]	[0.00]	[0.47]	[0.00]	[0.07]	[0.00]	[0.29]	[0.00]	[0.01]	[0.00]	[0.05]
R^2	0.47	0.47	0.49	0.48	0.48	0.48	0.47	0.48	0.48	0.48	0.48	0.48
Sample size	10216	4895	5321	10216	12739	6203	6536	12739	14099	6519	7580	14099

Figure 1
Educational attainment in Brazil



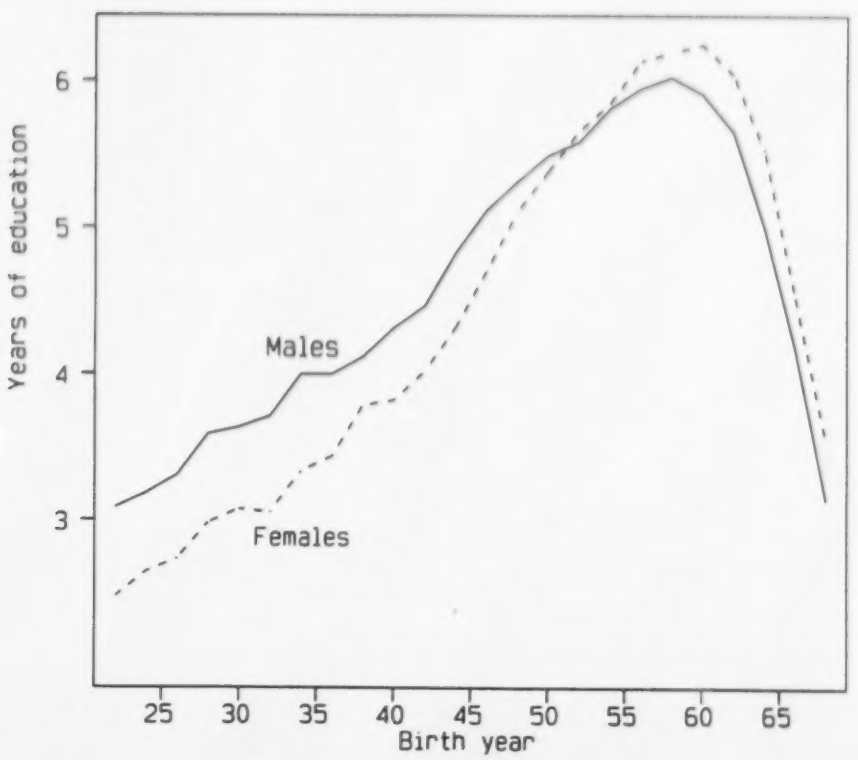
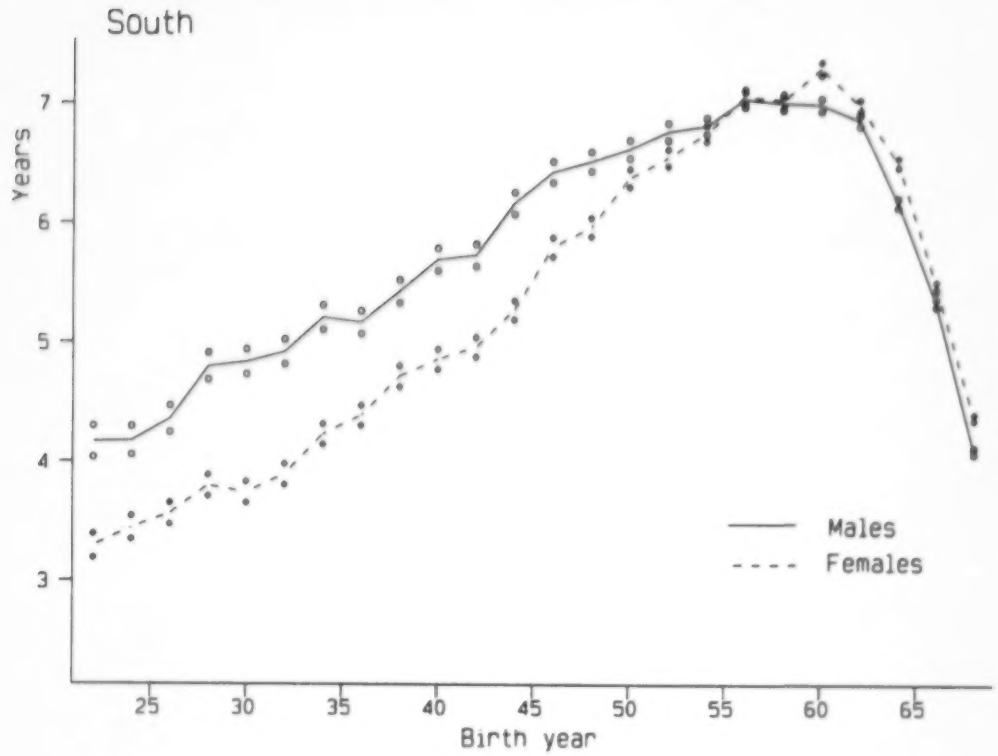


Figure 2
Completed years of education of men and women
in urban South and Northeast of Brazil



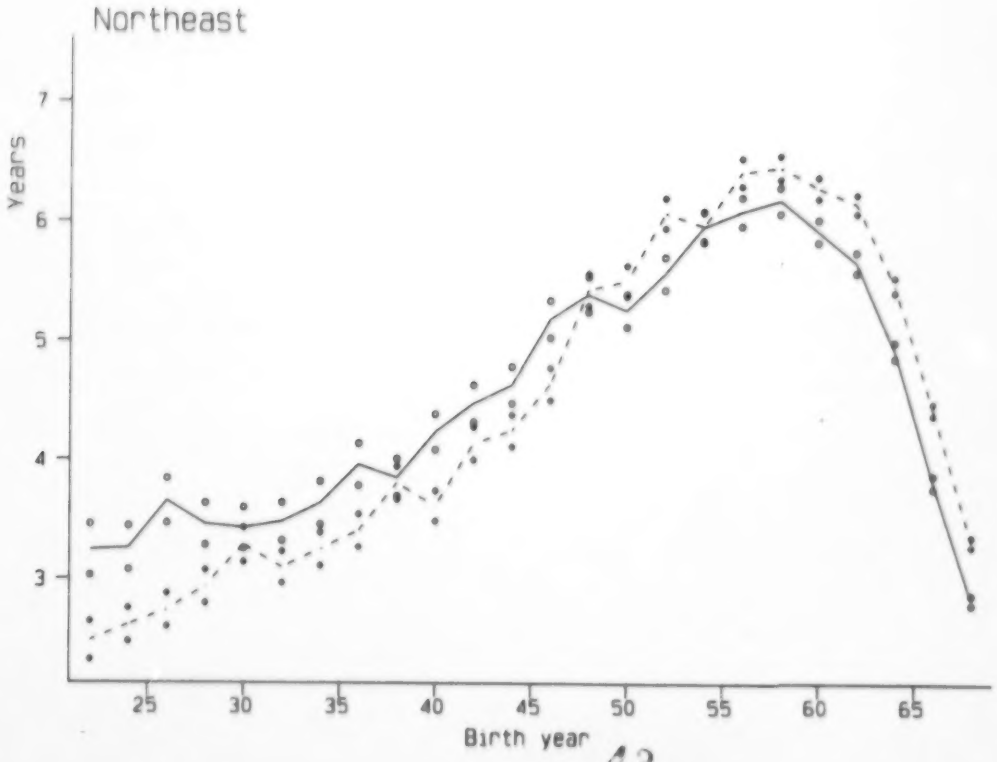
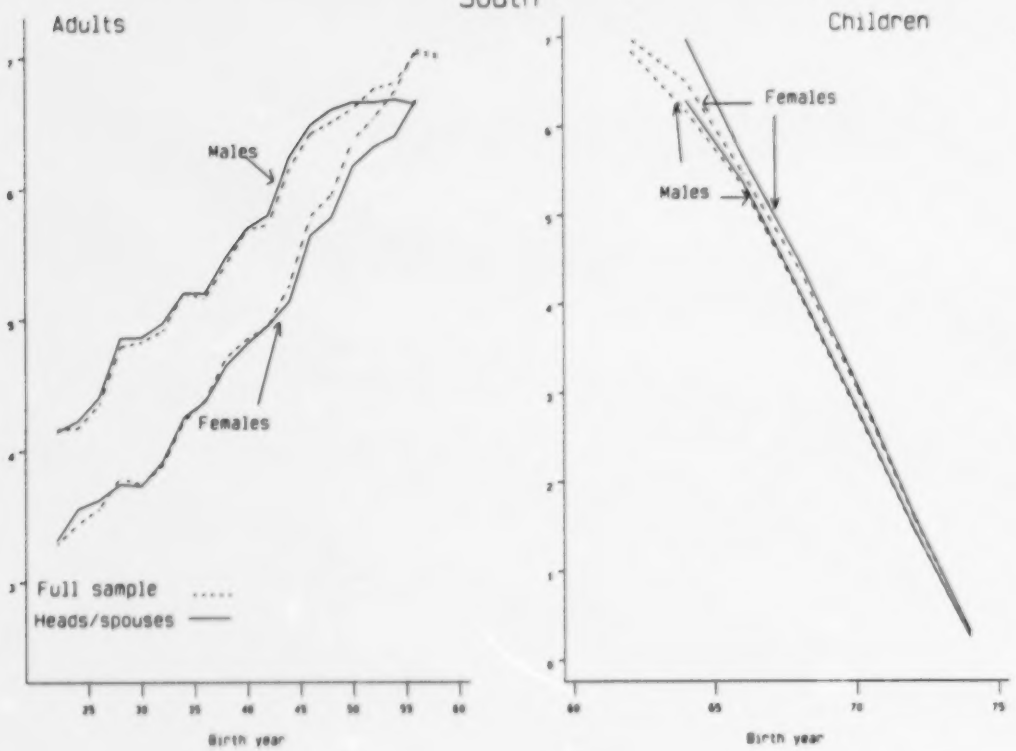
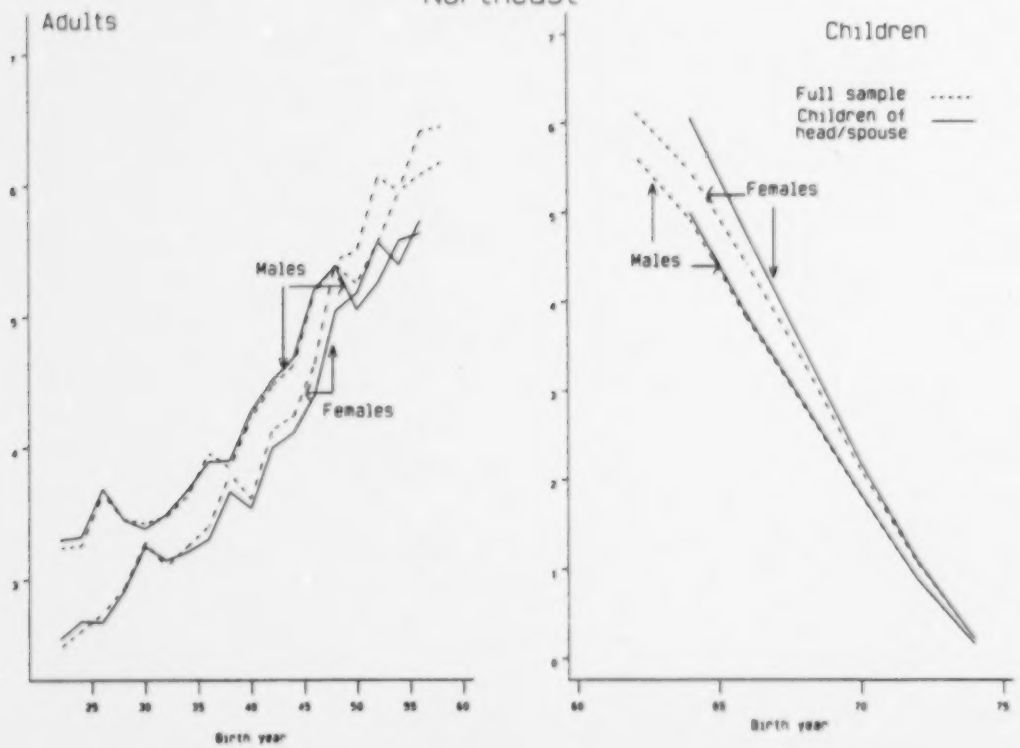


Figure 3
Completed years of education
Comparison of analytical and full samples

South



Northeast



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